

Investigating the role of digital transformation and digital innovation on school performance**Erdawaty Kamaruddin^a, Ibnu Salman^{b*}, Nunu Ahmad Annahid^b, Munawiroh^b, Heni Waluyo Siswanto^b, Imran Siregar^b, Suprpto^b, Ahmad Habibullah^b, Dwi Purwoko^c, Haudi^d and Agus Purwanto^e**^aUniversitas Negeri Jakarta, Indonesia^bNational Research and Innovation Agency, Republic of Indonesia^cThe Indonesian Institute of Sciences, BRIN, Indonesia^dSekolah Tinggi Agama Buddha Dharma Widya, Indonesia^eTanri Abeng University, Indonesia**CHRONICLE***Article history:*

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This research aims to analyze the relationship between digital transformation and school performance and the relationship between digital innovation and school performance. The research method is quantitative through surveys, research data was obtained by distributing online questionnaires to 489 high school teachers throughout Indonesia who were selected using a simple random method. Data analysis used covariance-based structural equation modelling (CB-SEM) with SmartPLS 4.0 software to analyze research data. The independent variables are digital transformation and digital innovation, and the dependent variable is school performance. The stages of data analysis are validity testing, reliability testing, model fit testing and significance testing of hypothesis testing. The results of this research are that digital transformation has a positive and significant relationship with performance. Moreover, digital innovation has a positive and significant relationship to performance. The findings of this research support and prove the results of previous research that digital transformation has a positive effect on organizational performance and innovation and confirms the direct influence of innovation on organizational performance. The contribution of this research is aimed at various literature related to the role of digital transformation and innovation on organizational performance. Meanwhile, for practical implications, digital transformation and innovation can improve organizational performance, especially in schools.

1. Introduction

Technology has developed very rapidly in the current era, which has opened the way for developments in the 4.0 revolution, where all social activities use technology (Bastidas et al., 2023). Not only the public, the use of technology has also been widely used by companies, both companies with large business scales and companies with small business scales. The role of technology that is developing in such a way is driven by the needs that occur in the field. According to Boroujerdi et al. (2019), technology plays an important role in the ease of the process provided. The ease of access and use provided by technology means that technology has been widely used in all companies. The use of technology in companies is expected to develop business processes and company values. According to Oscarius et al. (2021), the habit of using technology for learning must also be followed by a transformation of learning patterns for both teachers and students. Gaps in digital teaching methods are creating new habits of learning anytime, anywhere. In this current era, society must undergo digital transformation. This digital transformation is the beginning of creating new, more effective and efficient ways to replace old processes

* Corresponding author.

E-mail address erda_kamaruddin@unj.ac.id (E. Kamaruddin)

of doing things. This activity is carried out by utilizing existing technology. Over the last few decades, the world of education has developed very rapidly due to technological advances brought about by digital transformation (Skare et al., 2023; De Bem Machado et al., 2022). E-learning or online learning is one of the characteristics of digital transformation in the world of education today. Digital transformation in the educational context can be both an opportunity and a challenge, depending on how the institution responds to it. According to Islam et al. (2017), digital transformation has revolutionized not only online learning, but also the world of education. The examples above are just a few of the many changes that digital transformation has brought to the world of education. Therefore, analysis is needed to find opportunities and challenges for digital transformation in the world of education today. This is very necessary because knowledge about opportunities and challenges can be used as assessment material for the world of education, especially for educators. This facilitates maximum learning in the rapid development of technology. It can also help create new innovations and lead to more engaging learning.

Digitalization is one of the main strategies for overcoming various structural issues that hinder the achievement of quality education in Indonesia (Feliciano et al., 2023). This is because support for the use of digital technology in education has a good impact on a country's educational performance. In the context of globalization and increasingly rapid technological developments, the Industrial Century 5.0 School is the right solution to prepare the young generation to face future challenges. This concept places students as active subjects in the learning process, and provides space for them to develop their potential, interests and talents (Fahmi et al., 2022; Skare et al., 2023). With support from the government, educational institutions, teachers, parents and the community, the implementation of the Industrial Century School 5.0 concept can be realized effectively and provide maximum results for students and the community. Industrial Century School 5.0 is an educational concept developed to anticipate future technological and industrial developments. This concept combines advanced technology, new learning methods, and development of individual skills in facing challenges in the digital era.

2. Literature Review and Hypothesis Development

2.1 Digital Transformation

Digital transformation impacts organizations in different ways (Zoppelletto et al., 2023; Farias-Gaytan et al., 2022). The biggest impact that is expected to occur is on the organization's value proposition, the customer segments that can be identified and served, the way the organization reaches its customers, and the resources it has. Based on a literature review, the impact of digital transformation can be grouped into four main topics, including its impact on customers and customer relationships; its impact on value creation and business models; impact on internal company and organizational structure; and its impact on processes and efficiency (Li et al., 2023). Digital technology can influence consumer behavior which will later become a driving force for companies to interact with customers. It will be easier for companies to advertise products to potential customers widely without being limited by market boundaries. Apart from that, interactions between customers and companies can be further improved through exchanging information and being able to respond immediately and easily. For example, by assessing the products purchased and providing feedback to the company on social media. Therefore, Companies will know what consumers are interested in and are not interested in.

2.2 Digital Innovation

According to Islam et al. (2017) digital Innovation carried out by large organizations such as companies to develop their business activities. So, digital innovation can find solutions for more creative business activities, creativity and better product quality. The benefit of Digital Innovation is that it provides a competitive advantage, through digital innovation, companies can overcome consumer, product and management problems. Thus, increasing profits and speeding up product distribution to consumers. Protect the company from threats. Companies that carry out digital innovation do not reject change. According to Rehman et al. (2021), the advantage is that they will not be left behind by their competitors and will remain the choice of consumers. Increase productivity. If the company's productivity is slow, it will incur more costs. To overcome this, we can take advantage of digital innovation and speed up business activities. Thus, easing the human workload and saving more on production costs. Knowing Consumer Wants because consumer needs vary and continue to change according to conditions. Digital innovation can include the use of various applications and software, such as e-commerce, marketplace platforms, business management systems and other technologies to facilitate the production, distribution, and marketing of local products. In the context of local economic development, digital innovation can help overcome various challenges faced by local business actors, such as lack of access to wider markets, business management problems, and lack of skilled human resources (Wang & Esperança, 2023). By implementing digital innovation, local businesses can develop their businesses more effectively and efficiently, increase the competitiveness of local products and services, and develop new markets for their products. Apart from that, digital innovation can also help increase community involvement in the local economy. For example, local e-commerce platforms can provide opportunities for local businesses to market their products online and reach a wider market, while social platforms can help promote local products and build public awareness about local products. The application of digital innovation in local economic development can also encourage regional economic growth and create new jobs. By developing a strong and sustainable local economic sector, regions can attract investment and grow the economy.

2.3 Performance

According to Liao et al. (2007), organizational performance is a measure of how well an organization is able to meet its goals and objectives compared to its main competitors. In principle, organizational performance is focused on the capability and ability of the organization to efficiently utilize available resources to achieve achievements that are consistent with the stated goals and consider their relevance to their users. One of the resources that is realized is adopting and integrating digital technology and innovation as a strategic organizational competitive need to provide the greatest positive effect on the organization. Organizations can achieve sustainable organizational performance excellence by gathering resources that generate economic value and can maintain efforts to increase competitiveness. Organizational performance is the result produced by a company within a certain period based on predetermined standards. Basically, company performance is a result that can be measured and describes the empirical conditions of the company from various agreed measures. To find out the performance that has been achieved, a performance assessment is carried out.

3. Hypothesis development

3.1 The relationship between digital transformation and Performance

Digital transformation is very important for building competitive advantage and maintaining market competitiveness, both locally and internationally. The main difficulty and obstacle to the digital transformation process is not technology, but the human factors itself, such as employee resistance to change, lack of employee digital knowledge and experience, and lack of motivation (Cardoso & Gomes, 2011). The research also concluded that employees' digital experience has an influence significant for companies undertaking digital transformation (Wang & Esperança, 2023). Digital transformation impacts organizations in different ways. The biggest impact that is expected to occur is on the organization's value proposition, the customer segments that can be identified and served, the way the organization reaches its customers, and the resources it has. Rehman et al. (2021) the impact of digital transformation can be grouped into four main topics, including impact on customers and customer relationships; impact on value creation and business models; impact on internal company and organizational structure; and its impact on processes and efficiency (Skare et al., 2023). Digital technology can influence consumer behavior which will eventually become driving the company to interact with customers. It will be easier for companies to advertise products to potential customers widely without being limited by market boundaries. Apart from that, interactions between customers and companies can be further improved through exchanging information and being able to respond immediately and easily. Based on this study, a hypothesis is prepared as follows:

H1: *Digital transformation has a positive and significant effect on Performance.*

3.2 The relationship between innovation and performance

Innovation is one of the key factors that influences organizational performance. Innovation drives convenience, novelty, broad reach, and contributes to competitiveness which ultimately influences organizational performance. Other research from Jar-mooka et al. (2021) has also proven that innovation will make organizations more efficient and create positive dynamics that influence improving organizational performance. According to Asbari et al. (2023), innovation is seen as a key competency for organizations to survive in a dynamic and competitive environment, maintain competitive advantage, and improve performance. Thus, innovation can increase organizational efficiency, add potential value, and bring intangible resources to be more responsive to customer needs as well as being able to develop more capabilities that lead to better organizational performance.

H2: *Innovation has a positive and significant relationship with performance.*

4. Method

This research method is quantitative through a survey, research data was obtained by distributing online questionnaires to 489 teachers of Indonesian senior high schools selected using a simple random sampling method, and the online questionnaire was designed using statement items with a Likert scale of 1 to 7. Data analysis used covariance-based structural equation modelling (CB-SEM) with SmartPLS 4.0 software tools to analyze research data. The independent variable is digital transformation and digital innovation, and the dependent variable is school performance. The stages of data analysis are validity testing, reliability testing, model fit testing and significance testing of hypothesis testing.

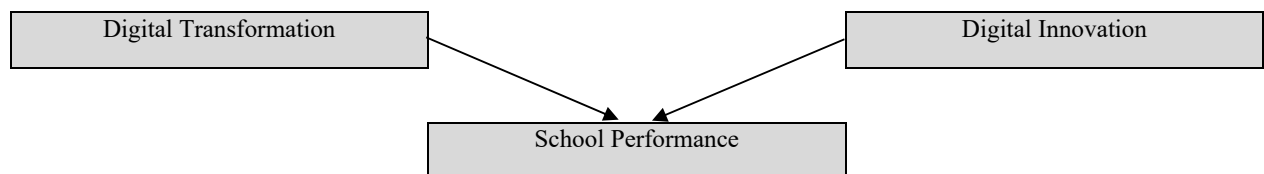


Fig. 1. Research Model

5. Result and discussion

5.1 Convergent validity

Convergent validity of the measurement model can be obtained from the correlation between the item/instrument score and the construct score (loading factor) with the criterion of a loading factor value for each instrument > 0.7 . Convergent Validity Convergent validity testing is carried out by looking at the outer loading value of each indicator on the latent variable. An outer loading value >0.7 indicates that a variable has explained 50% or more of the indicator variance. However, according to Chin & Wynne (1999), an outer loading value of 0.5 to 0.6 can be considered sufficient for convergent validity requirements.

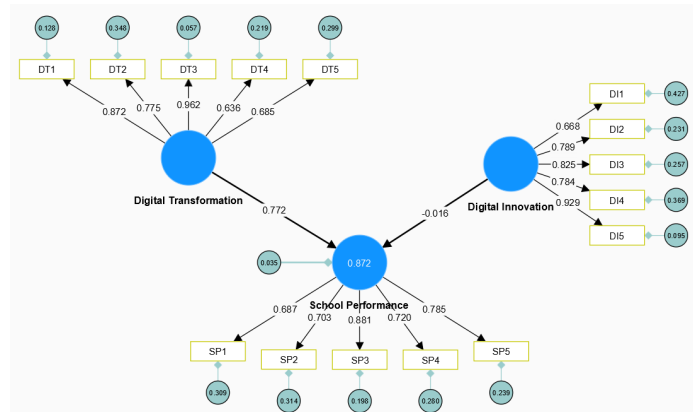


Fig. 2. Validity Testing

Based on Fig. 2, all indicators have an outer loading value of more than 0.7. This indicates that each study variable has been able to be explained by its indicators and meets the requirements for convergent validity. From the results of data processing using SmartPLS shown in Fig. 2 most indicators for each variable in this study have a loading factor value greater than 0.70 and are said to be valid.

5.2 Discriminant Validity

The value of the indicator correlation construct must be greater for the associated construct than for other constructs. A larger value indicates the suitability of an indicator to explain the associated construct compared to explaining other constructs. Discriminant Validity is carried out by looking at the cross-loading values of construct measurements. The cross-loading value shows the magnitude of the correlation between each construct and its indicators and the indicators of the other block constructs. A measurement model has good discriminant validity if the correlation between the construct and its indicators is higher than the correlation with indicators from other block constructs.

5.3 Composite Reliability

A composite reliability value of 0.6 – 0.7 and a Cronbach's alpha value of >0.7 are considered to have good reliability. Based on the table above, all constructs have a composite reliability and Cronbach's alpha value of >0.7 so it is concluded that they are reliable. Apart from being measured by assessing convergent validity and discriminant validity, the outer model can also be done by looking at the reliability of the construct or latent variable which is measured by the composite reliability value. A construct is declared reliable if the composite reliability has a value > 0.7 , then the construct is declared reliable. SmartPLS output results for composite reliability values can be shown in the table. From the SmartPLS output results in Table, the composite reliability value for all constructs is above 0.70. With the resulting values, all constructs have good reliability by the required minimum value limits.

Table 1
Reliability Test Cronbach's alpha

	Cronbach's Alpha	rho A	Composite Reliability
Digital transformation	0.903	0.931	0.943
Digital innovation	0.923	0.965	0.987
Performance	0.934	0.943	0.976

The next evaluation is by comparing the AVE root value with the correlation between constructs. The recommended result is that the AVE root value must be higher than the correlation between constructs (Kurniawan & Soediantono, 2022). The model has better discriminant validity if the square root of the AVE for each construct is greater than the correlation between the two constructs in the model. A good AVE value is required to have a value greater than 0.50. In this research, the AVE value

and square root of AVE for each construct can be shown in the table. The table shows that the square root value of AVE for each construct is greater than the correlation value so the construct in this research model can still be said to have good discriminant validity.

Table 2
Reliability Test AVE

	Average Variance Extracted (AVE)
Digital transformation	0.741
Digital innovation	0.709
Performance	0.613

5.3 Model Fit Criteria

To determine the relationship between latent variables, constructs, or factors and real indicators, or observed variables, we will use the Goodness of Fit criteria:

Table 3
Model Fit Criteria

Criteria	Acceptable fit	Value
Chi-square	>0.050	145.272
P Value	>0.050	0.051
Root Mean Square Error of Approximation (RMSEA)	≤ 0,08	0.06
Goodness of Fit Index (GFI)	≥ 0,90	0.93
Adjusted Goodness-of-Fit Index (AGFI)	≥ 0,90	0.93
Non-Normed Fit Index (NNFI)	≥ 0,95	0.97
Comparative Fit Index (CFI)	≥ 0,90	0.93
Root Mean Square Residual (RMR)	≤ 0.05	0.01
Parsimonious Goodness of Fit Index (PGFI)	≤ 1,00	0.91
Standardized Root mean square residual (SRMR)	≤ 0.08	0.07
Normed Fit Index (NFI)	≥ 0,90	0.96

The results of the fit model test show a chi-square value of 145.72 with a significance of 0.051 ($p > 0.05$). A significant value greater than 0.05 indicates that there is no difference between the sample covariance and the covariance of the prediction model.

Root Mean Square Error of Approximation (RMSEA)

RMSEA is an informative index in SEM. An RMSEA value < 0.05 indicates close fit, while $0.05 < \text{RMSEA} < 0.08$ indicates good fit. RMSEA values between 0.08 and 0.10 indicate mediocre (marginal fit), and RMSEA values > 0.10 indicate poor fit. RMSEA values show 0.068, meaning they indicate good fit.

Goodness of Fit Index (GFI)

The GFI can be classified as an absolute goodness-of-fit test because it basically compares a hypothesized model with no model at all. The GFI value must range between 0 (poor fit) to 1 (perfect fit), and a GFI value > 0.90 is good fit, while $0.80 < \text{GFI} < 0.90$ is called marginal fit. The GFI value shows 0.93, meaning it shows good fit.

Adjusted Goodness-of-Fit Index (AGFI)

AGFI is an extension of GFI which is adjusted to the ratio between the degree of freedom of the null/independence/baseline model and the degree of freedom of the hypothesized or estimated model. Like GFI, AGFI values range from 0 to AGFI values > 0.90 indicating good fit, while $0.80 < \text{AGFI} < 0.90$ is referred to as marginal fit. The AGFI value shows 0.94, meaning it shows good fit.

Normed Fit Index (NFI)

NFI has a value that ranges from 0 to 1. An NFI value > 0.90 indicates good fit, while $0.80 < \text{NFI} < 0.90$ is referred to as marginal fit. The NFI value shows 0.96, meaning it shows good fit.

Non-Normed Fit Index (NNFI)

NNFI is used to overcome problems that arise due to model complexity. Because NNFI is "non-normed", the NNFI value cannot be greater than 1. A value of $0.95 \leq \text{NNFI} < 0.97$ indicates good fit. The NNFI value shows 0.97, meaning it shows good fit.

Comparative Fit Index (CFI)

The CFI value ranges from 0 to 1. A higher CFI value indicates better fit. A value of $0.90 \leq CFI < 0.97$ indicates good fit. The CFI value shows 0.93, meaning it shows good fit.

Root Mean Square Residual (RMR)

RMR represents the residual mean value obtained from matching the variance-covariance matrix of the hypothesized model with the variance-covariance matrix of the sample data. Standardized RMR represents the value of the average of all standardized residuals and has a range from 0 to 1. A model that has a good fit will have a Standardized RMR value < 0.05 . The RMR value shows 0.01, meaning it shows good fit. SRMR is Standardized Root mean square residual which is a tool for measuring model fit. The condition used is that an SRMR value below 0.08 indicates a fit model, while an SRMR value between 0.08 and 0.10 is still acceptable. The SRMR value shows 0.07, meaning it shows good fit.

PGFI (Parsimonious Goodness of Fit Index)

PGFI modifies GFI since parsimony, estimated model. The PGFI value ranges from 0 – 1.0 with a higher value, it shows a parsimony model.

5.4 Hypothesis testing

To find out the structural relationship between latent variables, hypothesis testing must be carried out on the path coefficient between variables by comparing the p-value with alpha (0.050) or a t-statistic of (>1.96). The P-value and t-statistics are obtained from the output in SmartPLS using the bootstrapping method. Hypothesis testing is carried out by paying attention to the original sample estimates (O) values to determine the direction of the relationship between variables, as well as t-statistics (T) and p-values (P) to determine the level of significance of the relationship. Original sample values that are close to +1 indicate a positive relationship, while values that are close to -1 indicate a negative relationship. The t-statistics value is more than 1.96 or the p-value is smaller than the significance level.

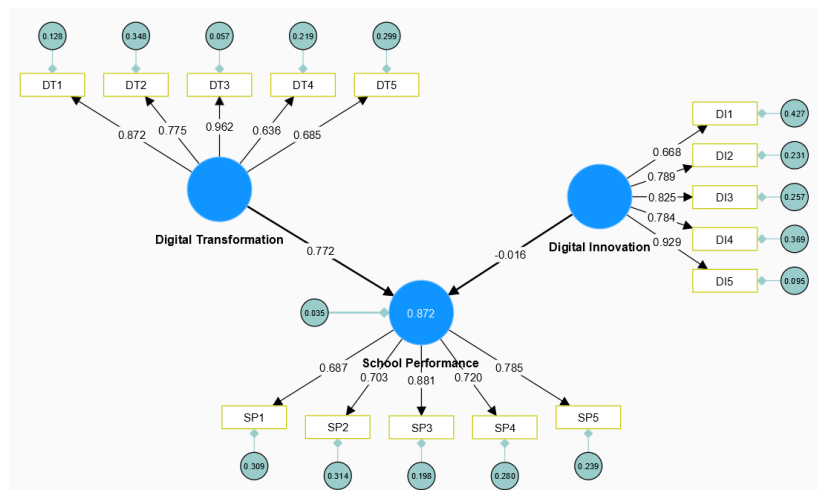


Fig. 3. Hypothesis Testing

Hypothesis testing is carried out based on the results of Inner Model testing (structural model) which includes r-square output, parameter coefficients and t-statistics. To see whether a hypothesis can be accepted or rejected, includes paying attention to the significance values between constructs, t-statistics and p-values. This research hypothesis testing was carried out with the help of SmartPLS (Partial Least Square) 3.0 software. These values can be seen from the bootstrapping results. The rules of thumb used in this research are t-statistics > 1.96 with a significance level of p-value of 0.05 (5%) and the beta coefficient is positive. The hypothesis testing value of this research can be shown in Table and the results of this research model can be depicted as shown in Fig. 3.

Table 3
Hypothesis Testing

	Correlation	T Statistics	P Values	Conclusion
Digital transformation and performance		4.897	0.000	Supported
Digital innovation and performance		2.098	0.000	Supported

5.4.1 *The relationship between digital transformation and performance*

According to the results of data analysis using structural equation modeling (SEM) partial least squares (PLS), a p value of 0.000 was found and the path coefficient was positive, so it was concluded that digital transformation has a positive and significant relationship to performance. Digital transformation includes fundamental changes in the way a business or organization operates using digital technology. It involves the integration of digital technology into every aspect of a business or organization, including changes in business models, operating processes, and customer experience. Digital transformation includes more than just processing digital data, it changes the way an organization functions. Digitalization focuses more on data processing electronics, while digital transformation includes a significant change in the way a business or organization operates through the integration of digital technology (Asbari et al., 2023). Digital transformation is the combined effect of several digital innovations produced by the actors or actors involved, structures, practices, values, and beliefs that change, threaten, replace, or complement the existing rules of the game in an organization, ecosystem, industry, or other fields, digital transformation are two different concepts even though they are closely related to use of digital technology. Digitalization refers to the process of changing information from analog format to digital format. This may include converting physical documents into digital files, recording data in digital format, or taking pictures and videos using a digital camera. Digitalization focuses more on electronic data processing and can be considered the first step in the adoption of digital technology. for Schools to carry out digital transformation to increase business competitiveness and expand market share (Skare et al., 2023). With the digital transformation of processes and operations, the down streaming of products from producers to consumers will increase, speed of service, improved trust, secure data exchange platforms but also opportunities for digital transformation. With digital transformation, a new entrepreneurial ecosystem will be formed in a digital direction capable of competing with international competitors. By carrying out digital transformation, Schools can increase their competitive advantage and expand market reach, increasing operational efficiency by reducing time and costs business activities, and increasing market access or downstream to consumers. Digital transformation has proven to be productive in improving organizational performance. The role of digital technology makes an organization's internal operations run quickly and easily. In this case, digital transformation is not only effective for streamlining business operations processes, but also presents opportunities for value creation and business growth, thereby improving organizational performance to achieve competitive advantage.

5.4.2 *The Effect of Innovation and Organizational Performance*

Based on the results of data analysis, a p value of $0.000 < 0.050$ was obtained, so it was concluded that innovation has a positive influence on performance. Innovation at the organizational level is defined as a technology, strategy or management practice used by organizations or other users who have adopted digital technology or not, or as a significant restructuring or improvement in a process. Innovation improves organizational performance through improving product/service quality, introducing new products/services in a timely manner, and responding well to customers. Previous research has proven that there is a positive relationship between innovation and organizational performance. The results of research by Novitasari (2022) found evidence that organizations that utilize innovation and digital potential gain large profits in carrying out and facilitating organizational activities. It is not surprising that organizations with great innovation demonstrate their ability to develop new capabilities and respond to the ever-evolving business climate for the progress of their organization.

Innovation is one of the key factors that influences organizational performance (Zoppelletto et al., 2023). According to Siswanto et al. (2023) innovation drives convenience, novelty, broad reach, and contributes to competitiveness which ultimately influences organizational performance. Innovation will make the organization more efficient and create positive dynamics that influence improving organizational performance. This emphasizes that innovation is seen as a key competency for organizations to survive in a dynamic and competitive environment, maintain competitive advantage, and improve performance. Thus, innovation can increase organizational efficiency, add potential value, and bring intangible resources to be more responsive to customer needs and able to develop more capabilities that lead to better organizational performance.

Purwanto et al. (2023) the implementation of transformation through information technology, or what is known as digital transformation, is being intensively carried out considering the industrial revolution. Digital transformation will provide benefits by improving service customization, increasing customer satisfaction, and reducing sales costs. Digitalization can improve communication, transparency, monitoring and integrate interactions between business partners thereby reducing coordination costs, transaction costs and agent costs. We have researched the benefits and costs of digital transformation and found a positive correlation between the intensity of digital transformation and operational performance and financial performance. Companies that increase their digital intelligence will be successful in implementing digital transformation which will ultimately have a positive impact on company revenue and growth (Islam et al., 2017). The use of digital technology has a positive impact on an organization's digital transformation strategy and innovation, which in turn affects company performance. Various other studies also show that information technology capabilities and the application of digital transformation can increase sales, profitability and market value of a company. Motivated by several studies showing that many countries have experienced improved financial performance by switching from traditional production methods to digital systems, researchers are interested in examining whether digital transformation can also improve the financial performance of companies in Indonesia.

At the organizational level, digital transformation is a powerful weapon for organizations to build and maintain competitive advantages in the digital era. Digital transformation plays a vital role in ever-evolving organizational operations to increase customer satisfaction and reduce operational costs. The implications of digital transformation show that digitalization can influence organizational performance. Successful digital transformation depends on whether the organization can develop several capabilities in various fields and these capabilities differ depending on the particular sector as well as the specific needs of the organization. The existence of digital integration in each value chain can reduce coordination costs, operational costs and other costs through increased communication, transparency and monitoring which ultimately results in increased organizational performance.

6. Conclusion

The results of this research are that digital transformation has a positive and significant relationship to performance and digital innovation has a positive and significant relationship to performance. In conclusion, the findings of this research support and prove the results of previous research that digital transformation positively influences organizational performance and innovation, as well as confirming the direct influence of innovation on organizational performance. The contribution of this research is aimed at various literature related to the role of digital transformation and innovation on organizational performance. Meanwhile, for practical implications, digital transformation and innovation can improve organizational performance, especially for schools. Digital transformation in the world of education in these turbulent times also creates opportunities and challenges that are recognized by society, especially educators and students. There are many factors that influence the opportunities and challenges of digital transformation in education. One of them is geography which makes it difficult for some people in Indonesia to follow the ongoing digital transformation. To optimize the proportion of digital transformation opportunities in education, society and government need to work together to create a smart and qualified workforce as well as the right technology and facilities. Because if only one party participates, there will only be challenges that will result in limitations in their education.

References

- Asbari, M., Purba, J. T., Hariandja, E. S., & Sudibjo, N. (2023). The Mediating Role of Dynamic Leadership towards the Relationship between Knowledge-Sharing Behaviour and Innovation Performance in Higher Education. *International Journal of Learning, Teaching and Educational Research*, 22(11), 466-485
- Bastidas, V., Oti-Sarpong, K., Nochta, T., Wan, L., Tang, J., & Schooling, J. (2023). Leadership for responsible digital innovation in the built environment: A socio-technical review for re-establishing competencies. *Journal of Urban Management*, 12(1), 57-73.
- Boroujerdi, S. S., Hasani, K., & Delshab, V. (2019). Investigating the influence of knowledge management on organizational innovation in higher educational institutions. *Kybernetes*, 49(2), 442-459.
- Cardoso, L., & Gomes, A. D. (2011). Knowledge management and innovation: Mapping the use of technology in organizations. In *Technology for creativity and innovation: Tools, techniques and applications* (pp. 237-266). IGI Global.
- De Bem Machado, A., Secinaro, S., Calandra, D., & Lanzalonga, F. (2022). Knowledge management and digital transformation for Industry 4.0: a structured literature review. *Knowledge Management Research & Practice*, 20(2), 320-338.
- Fahmi, K., Sihotang, M., Hadinegoro, R. H., Sulastri, E., Cahyono, Y., & Megah, S. I. (2022). Health Care Schools Products Marketing Strategy: How the Role of Digital Marketing Technology through Social Media?. *UJoST- Universal Journal of Science and Technology*, 1(1), 16–22. <https://doi.org/10.11111/ujost.v1i1.55>
- Farias-Gaytan, S., Aguaded, I., & Ramirez-Montoya, M. S. (2022). Transformation and digital literacy: Systematic literature mapping. *Education and Information Technologies*, 27(2), 1417-1437.
- Feliciano, M. M., Ameen, N., Kotabe, M., Paul, J., & Signoret, M. (2023). Is digital transformation threatened? A systematic literature review of the factors influencing firms' digital transformation and internationalization. *Journal of Business Research*, 157, 113546.
- Islam, M. A., Agarwal, N. K., & Ikeda, M. (2017). Effect of knowledge management on service innovation in academic libraries. *IFLA journal*, 43(3), 266-281.
- Jarmooka, Q., Fulford, R. G., Morris, R., & Barratt-Pugh, L. (2021). The mapping of information and communication technologies, and knowledge management processes, with company innovation. *Journal of Knowledge Management*, 25(2), 313-335.
- Kurniawan, W., & Soediantono, D. (2022). The Role of Digital Transformation and Leadership Style on Financial Performance of Defense Industries. *Journal of Industrial Engineering & Management Research*, 3(3), 111 - 119. <https://doi.org/10.7777/jiemar.v3i3.291>
- Li, S., Gao, L., Han, C., Gupta, B., Alhalabi, W., & Almakdi, S. (2023). Exploring the effect of digital transformation on Firms' innovation performance. *Journal of Innovation & Knowledge*, 8(1), 100317.
- Liao, S. H., Fei, W. C., & Chen, C. C. (2007). Knowledge sharing, absorptive capacity, and innovation capability: an empirical study of Taiwan's knowledge-intensive industries. *Journal of information science*, 33(3), 340-359.
- Novitasari, D. (2022). Schools E-commerce Buying Intention: How the Effect of Perceived Value, Service Quality, Online Customer Review, Digital Marketing and Influencer Marketing. *Journal of Information Systems and Management (JISMA)*, 1(5), 61–69. <https://doi.org/10.4444/jisma.v1i5.256>

- Oscarius, Y., A. P., Sulistiyani, S., Pudjowati, J., Kartikawati, T. S., Kurniasih, N., & Purwanto, A. (2021). The role of social media marketing, entertainment, customization, trendiness, interaction and word-of-mouth on purchase intention: An empirical study from Indonesian smartphone consumer. *International Journal of Data and Network Science*, 5(3), 231-238.
- Purwanto, A., Purba, J., Bernarto, I., & Sijabat, R. (2023). Investigating the role digital transformation and human resource management on the performance of the universities. *International Journal of Data and Network Science*, 7(4), 2013-2028.
- Rehman, F. U., Ismail, H., Al Ghazali, B. M., Asad, M. M., Shahbaz, M. S., & Zeb, A. (2021). Knowledge management process, knowledge based innovation: Does academic researcher's productivity mediate during the pandemic of covid-19?. *Plos one*, 16(12), e0261573.
- Siswanto, E., Samsudi, S., Suprptono, E., Sutopo, Y., & Purwanto, A. (2023, October). The role of transformational leadership, work environment, motivation on job satisfaction and teachers performance of vocational schools. In AIP Conference Proceedings (Vol. 2765, No. 1). AIP Publishing.
- Skare, M., de Obesso, M. D. L. M., & Ribeiro-Navarrete, S. (2023). Digital transformation and European small and medium enterprises (Schools): A comparative study using digital economy and society index data. *International Journal of Information Management*, 68, 102594.
- Wang, S., & Esperança, J. P. (2023). Can digital transformation improve market and ESG performance? Evidence from Chinese Schools. *Journal of Cleaner Production*, 419, 137980.
- Zoppelletto, A., Orlandi, L. B., Zardini, A., Rossignoli, C., & Kraus, S. (2023). Organizational roles in the context of digital transformation: A micro-level perspective. *Journal of business research*, 157, 113563.



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